

# Evaluation on the Predictability of Seasonal Tropical Storm Activities in the NCEP CFSv2

Jae-Kyung Schemm and Lindsey Long

NOAA/NWS/NCEP/CPC

CFSv2 Evaluation Workshop

April 30, 2012

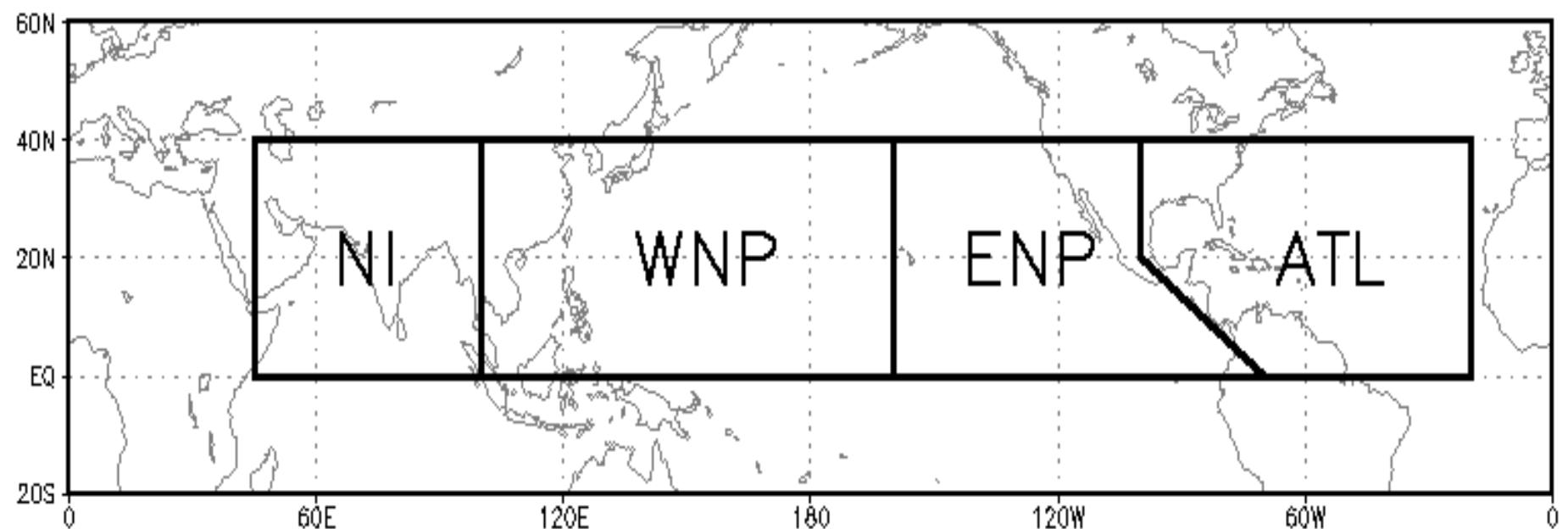
# Datasets

- CFS v2 Hindcasts
  - 16 Members: April 11<sup>th</sup>, 16<sup>th</sup>, 21<sup>st</sup>, 26<sup>th</sup> at 00, 06, 12, 18Z
  - 28 Years: 1982-2009
- CFS Hindcasts at T382
  - 5 Members: April 19-23 at 00Z
  - 28 Years: 1981-2008
- Months: May-November
- Time Interval: 6 hours
- Resolution: 1 x 1 degree grid
- Observations from HURDAT and JTWC Best Track Dataset
  - Tropical depressions and subtropical storms are not included in the storm count.

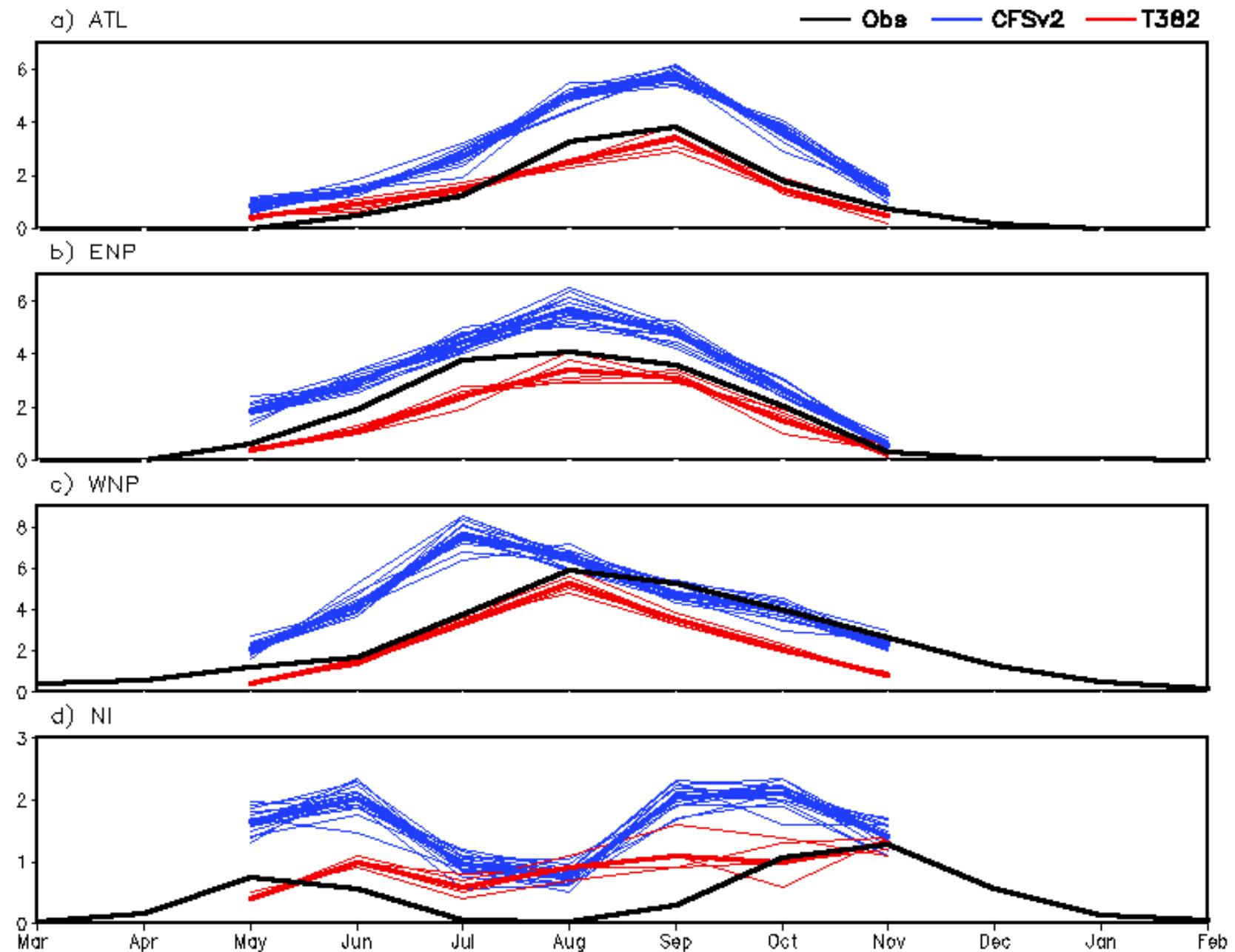
## Detection & Tracking Methods

- Method based on Camargo & Zebiak (2002)
  - Point must meet 7 criteria to be considered a storm
  - Ex: Minimum pressure, warm-core system
- Using detection thresholds unique to CFS version and basin
- Vorticity threshold used for tracking =  $3.5 \times 10^{-5} \text{ s}^{-1}$  (Atlantic)

# Four NH Ocean Basins



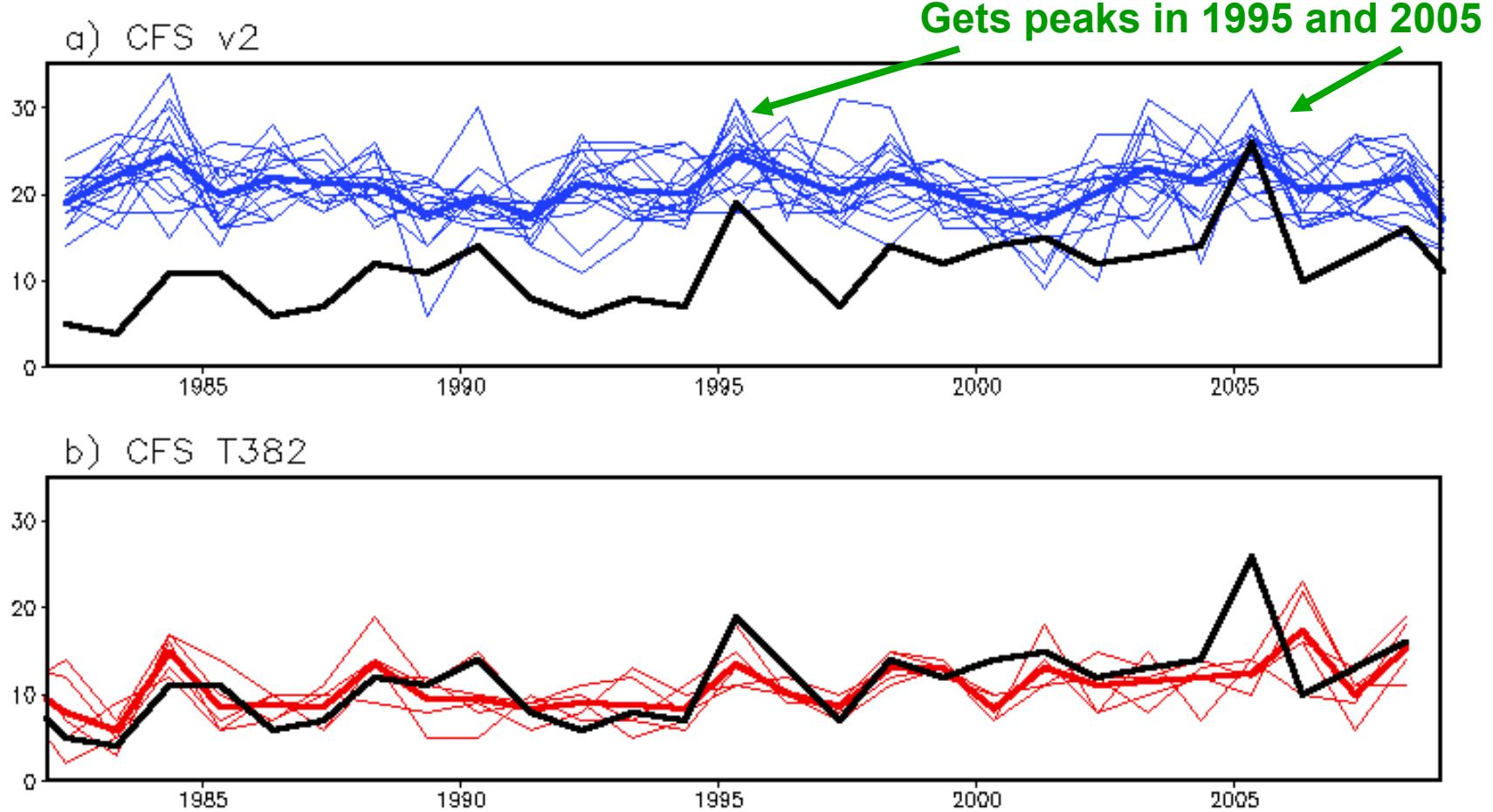
# Seasonal Cycle of TS Numbers



## Average Storm Count May - Nov

	Observed	CFS v2	CFS T382
ATL	11.3	20.7	10.9
ENP	16.4	23.0	12.9
WNP	27.4	31.5	18.0
NI	4.0	11.0	6.7

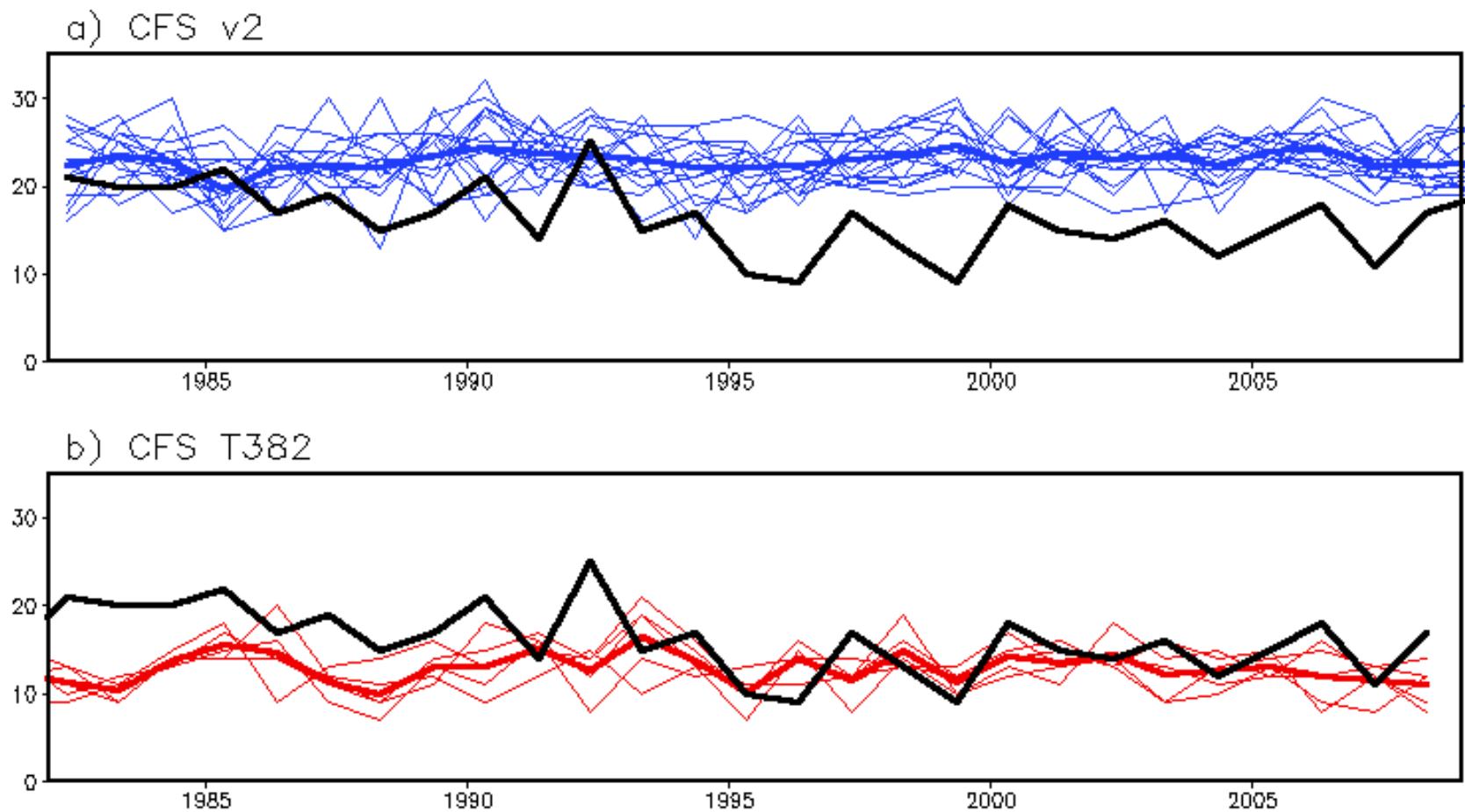
# ATL Interannual Variability



Spearman Rank Correlation

CFSv2 = 0.23, CFS T382 = 0.61

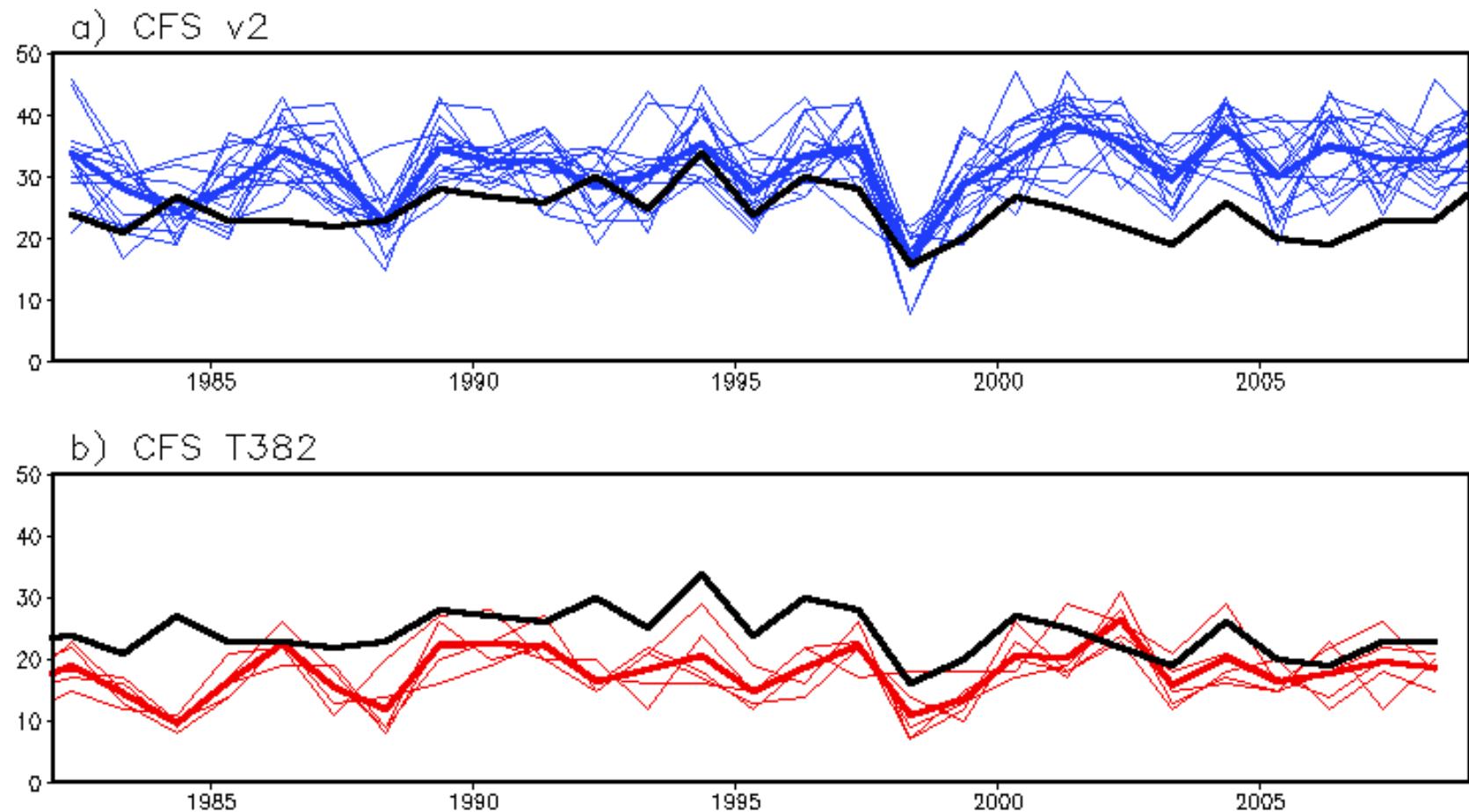
# ENP Interannual Variability



Spearman Rank Correlation

CFSv2 = -0.007, CFS T382 = -0.04

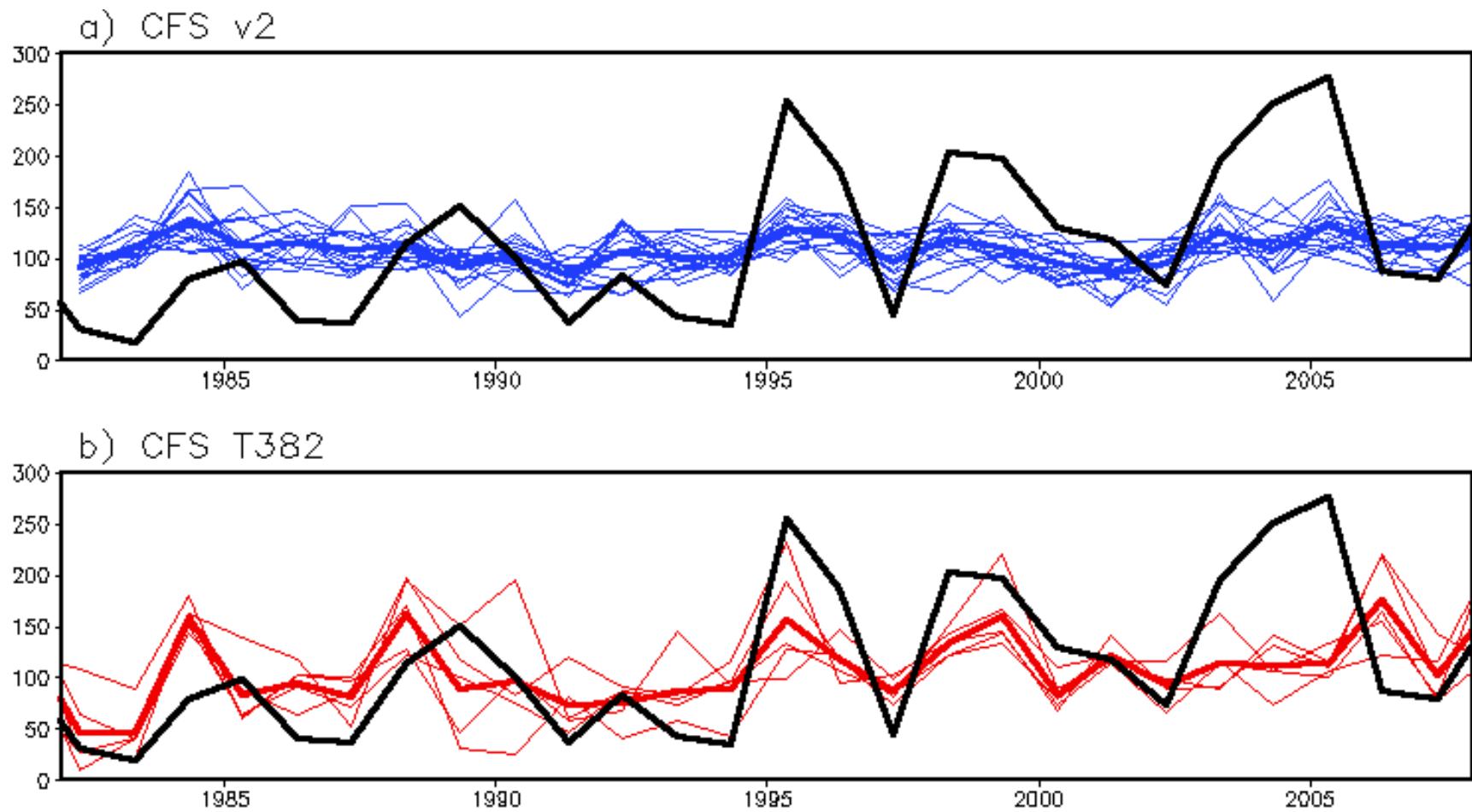
# WNP Interannual Variability



Spearman Rank Correlation

CFSv2 = 0.37, CFS T382 = 0.46

# ATL ACE Index - % of Median

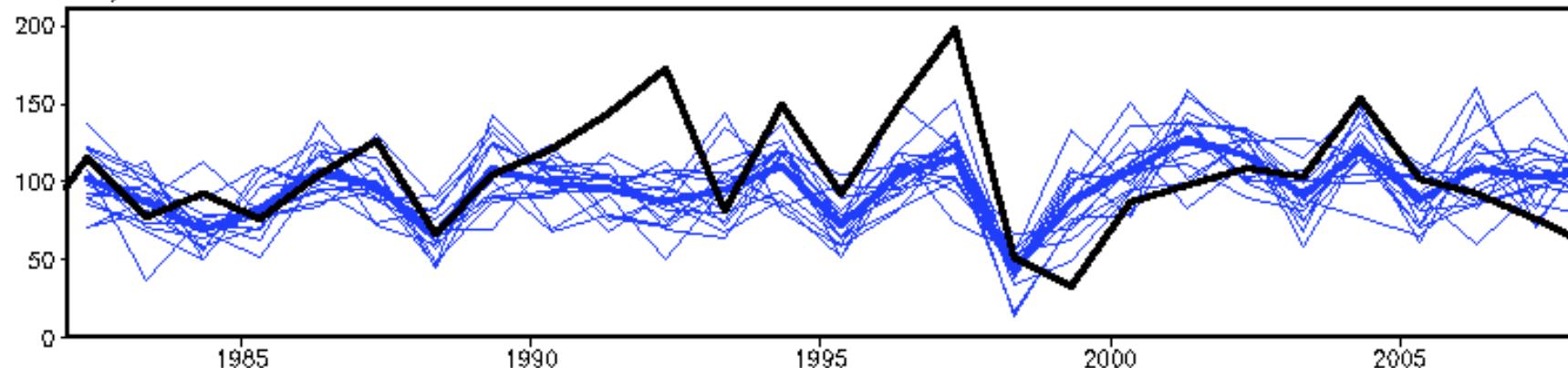


Spearman Rank Correlation

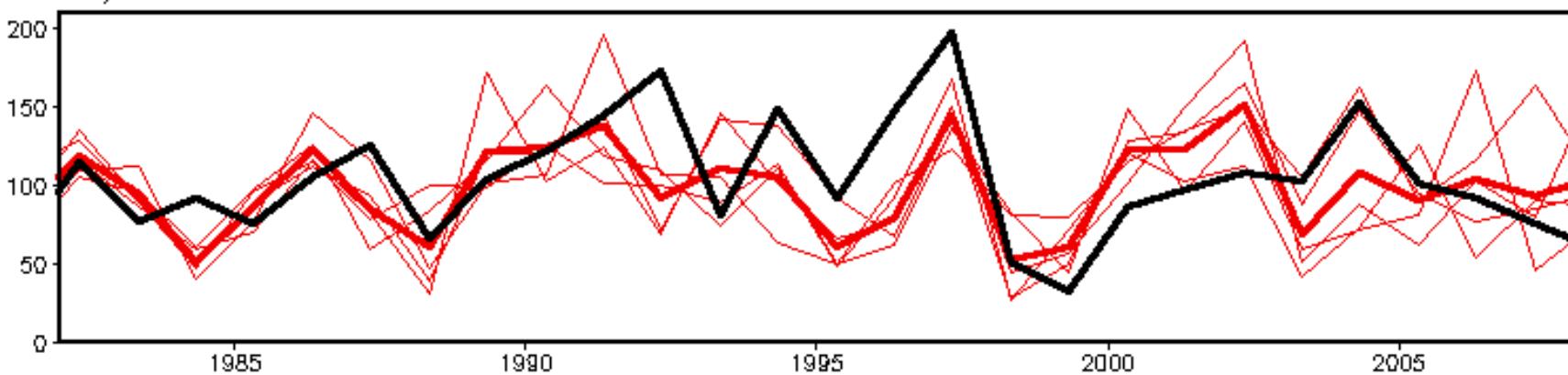
CFSv2 = 0.47, CFS T382 = 0.62

# WNP ACE Index - % of Median

a) CFS v2



b) CFS T382

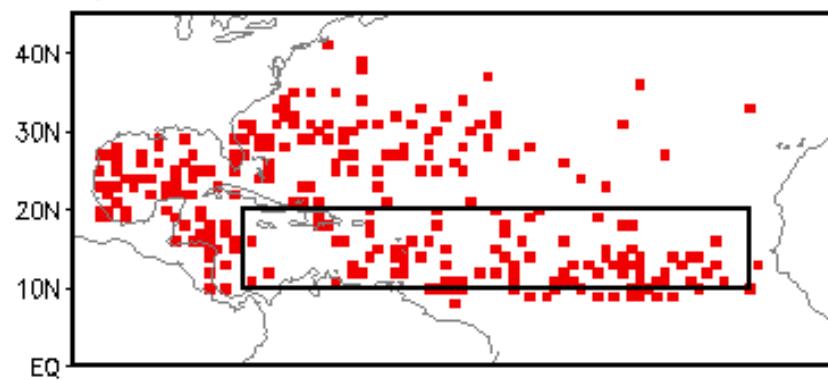


Spearman Rank Correlation

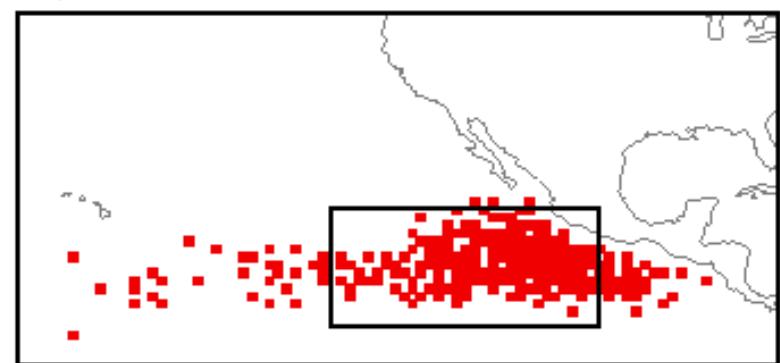
CFSv2 = 0.42, CFS T382 = 0.48

## Tropical Storm Origins, May-Nov

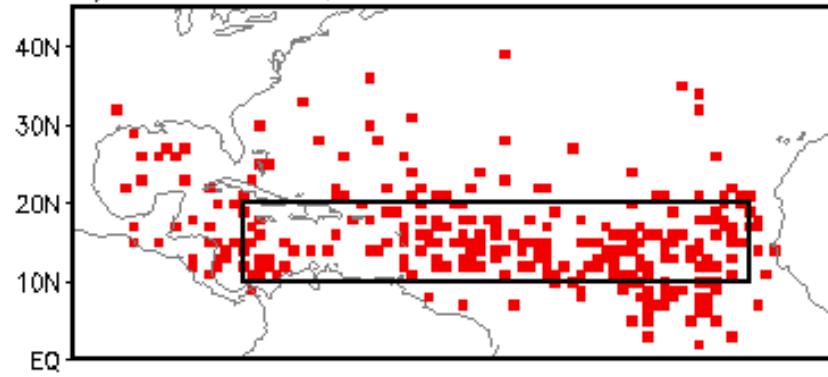
a) ATL Obs



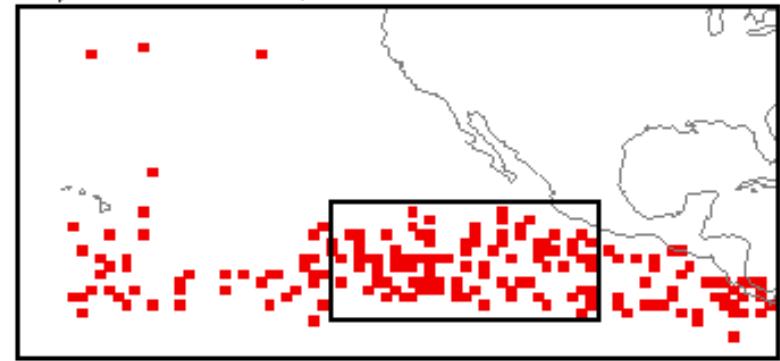
b) ENP Obs



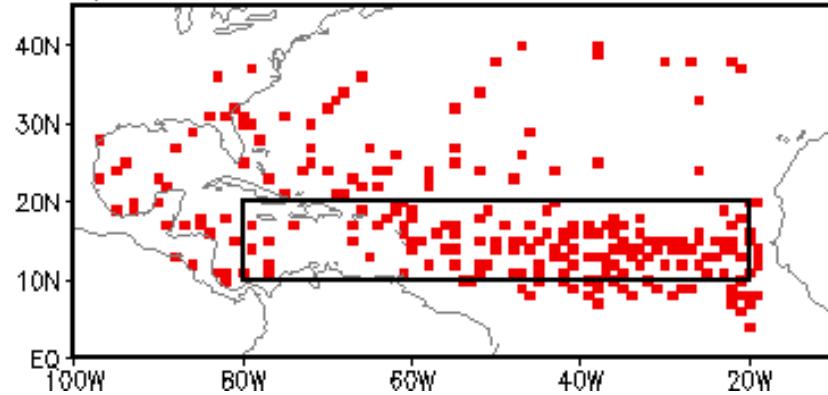
c) ATL CFS v2, IC=041118



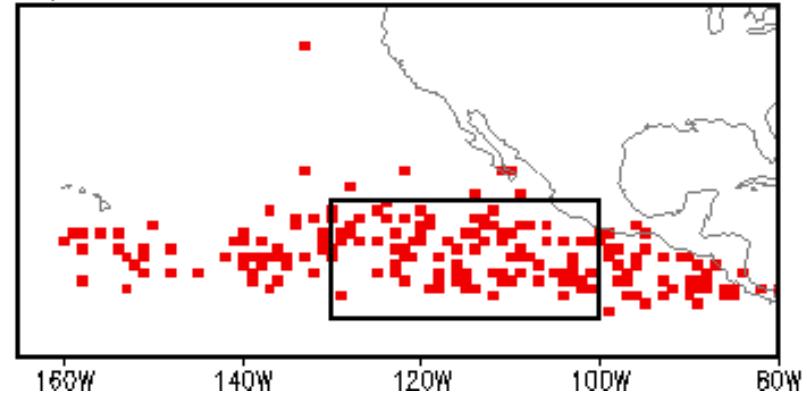
d) ENP CFS v2, IC=041118



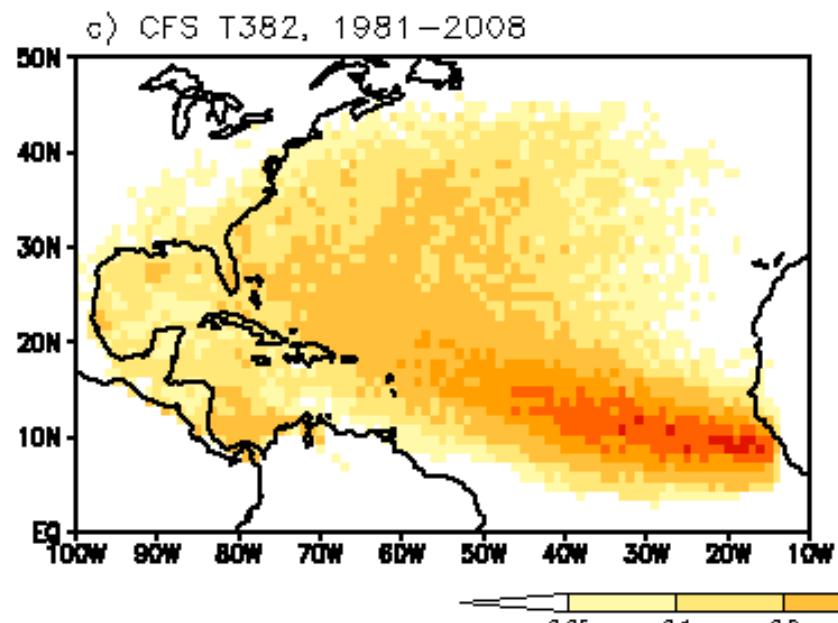
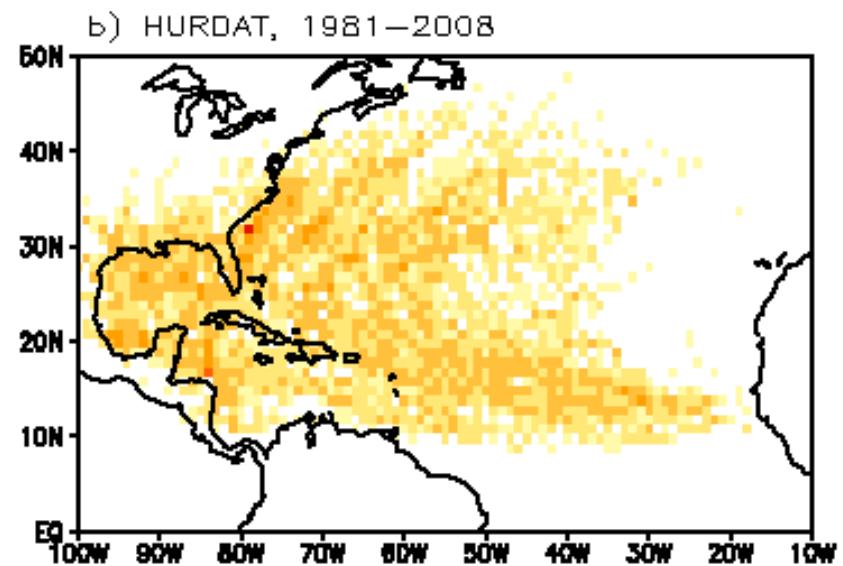
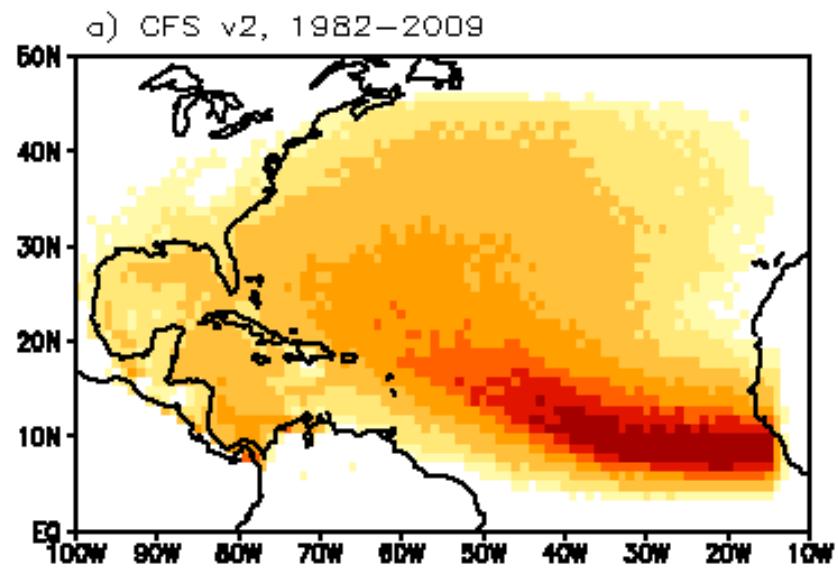
e) ATL CFS T382, IC=0423



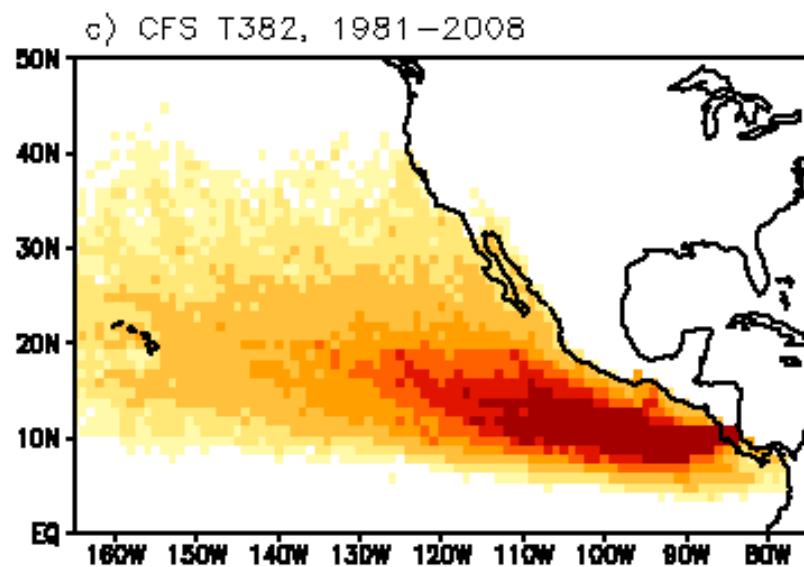
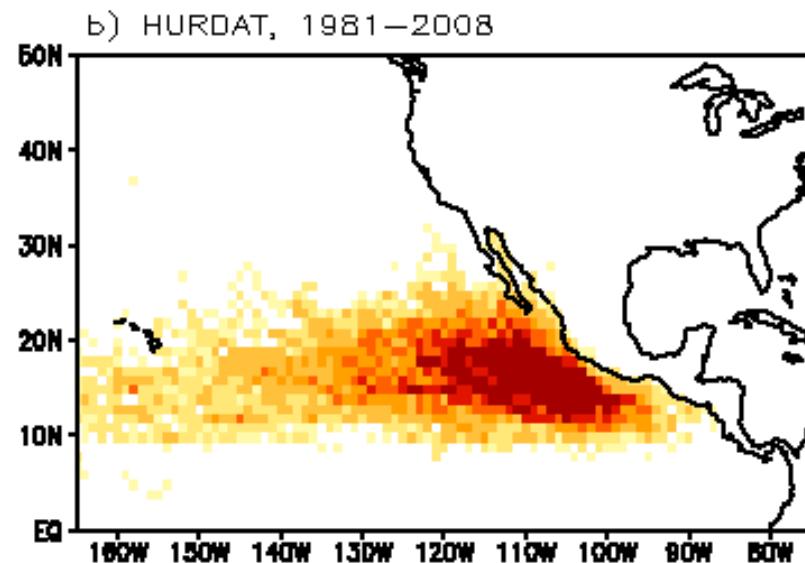
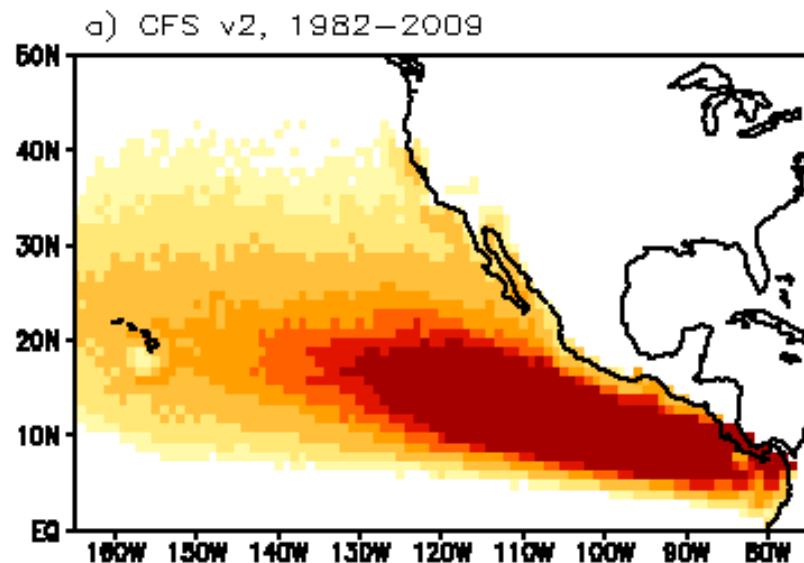
f) ENP CFS T382, IC=0423



# Storm Track Density

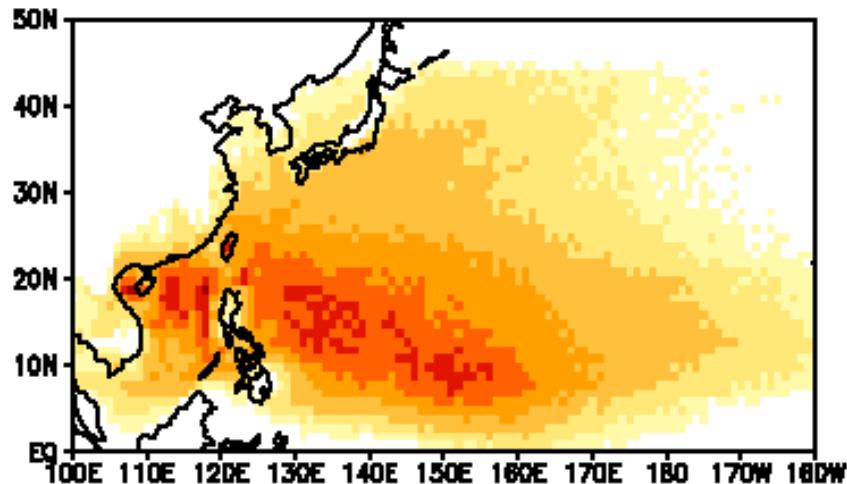


# Storm Track Density

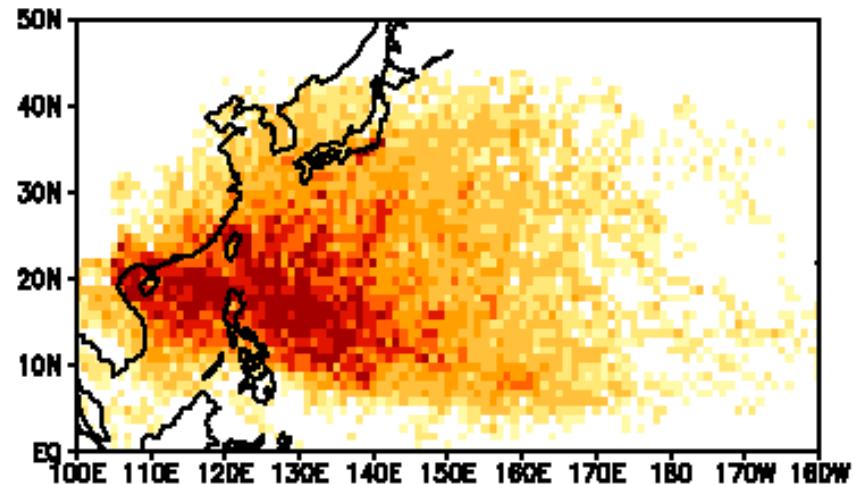


# Storm Track Density

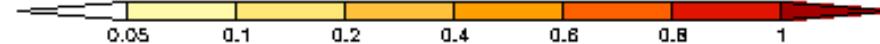
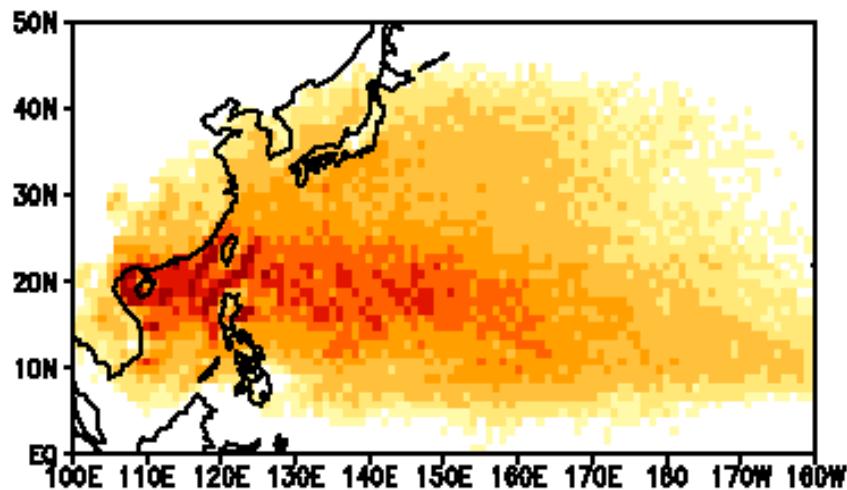
a) CFS v2, 1982–2009



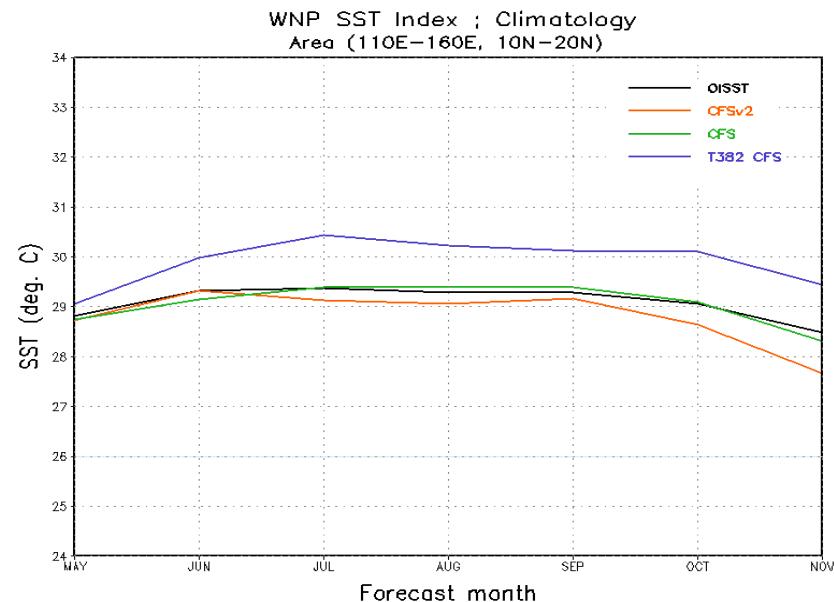
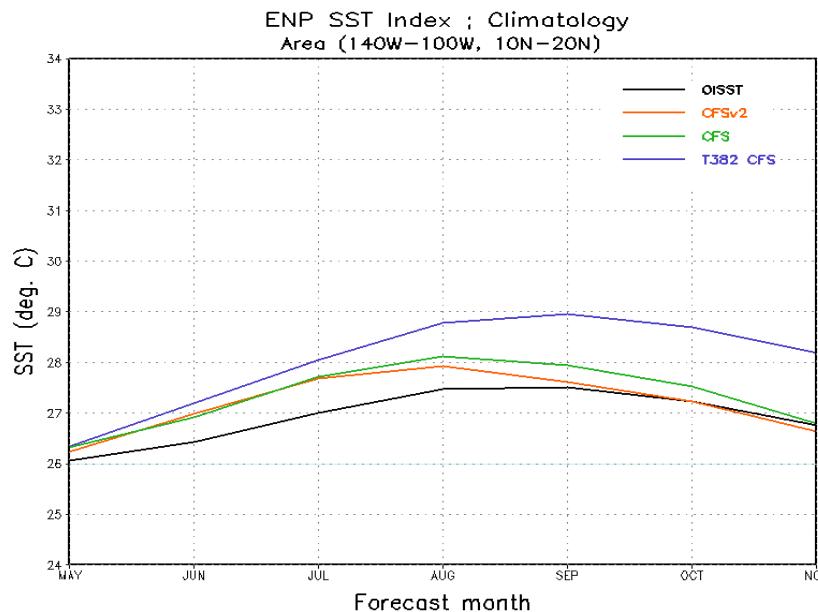
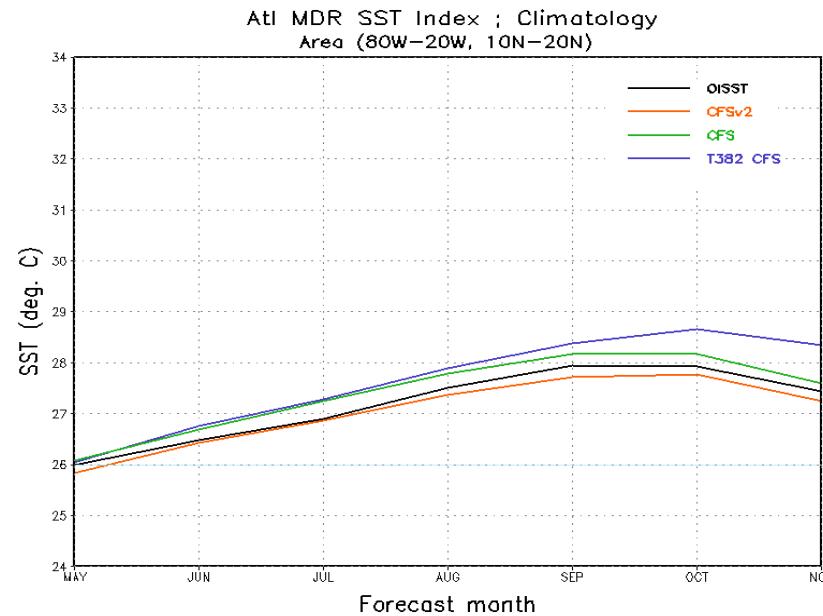
b) CFSR, 1981–2008



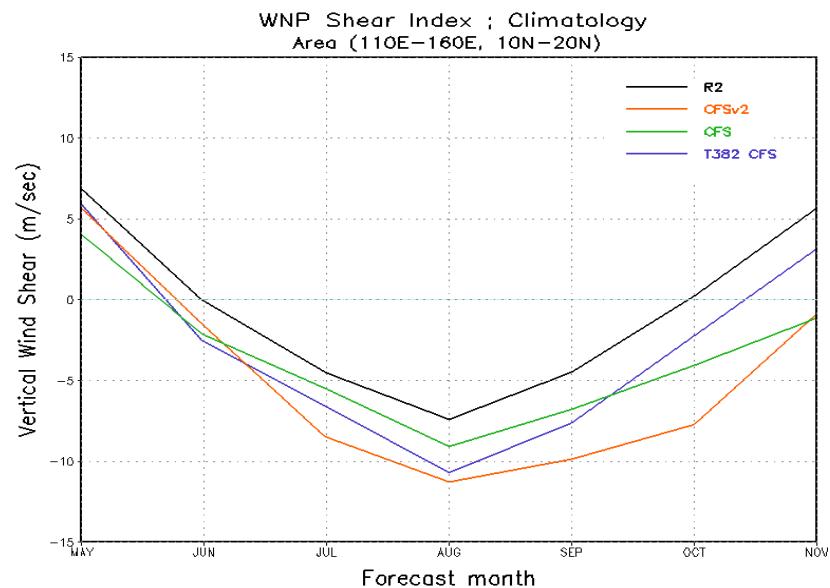
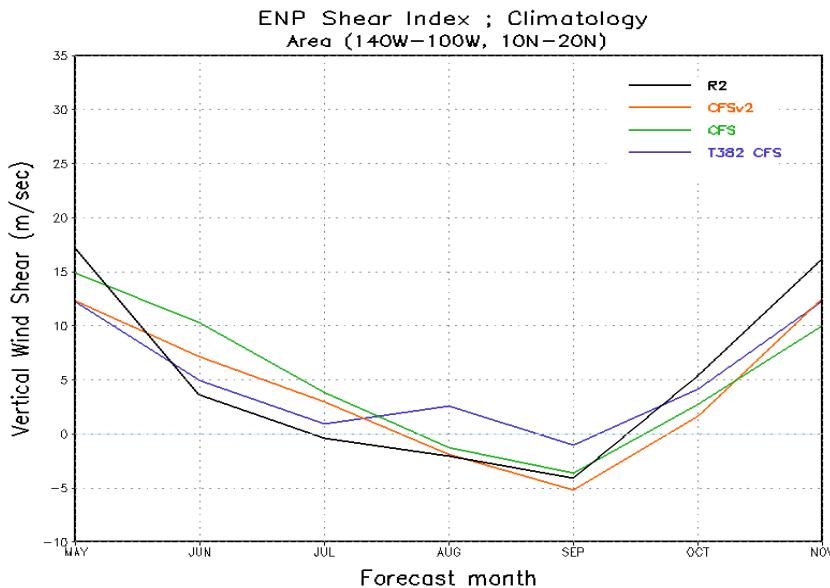
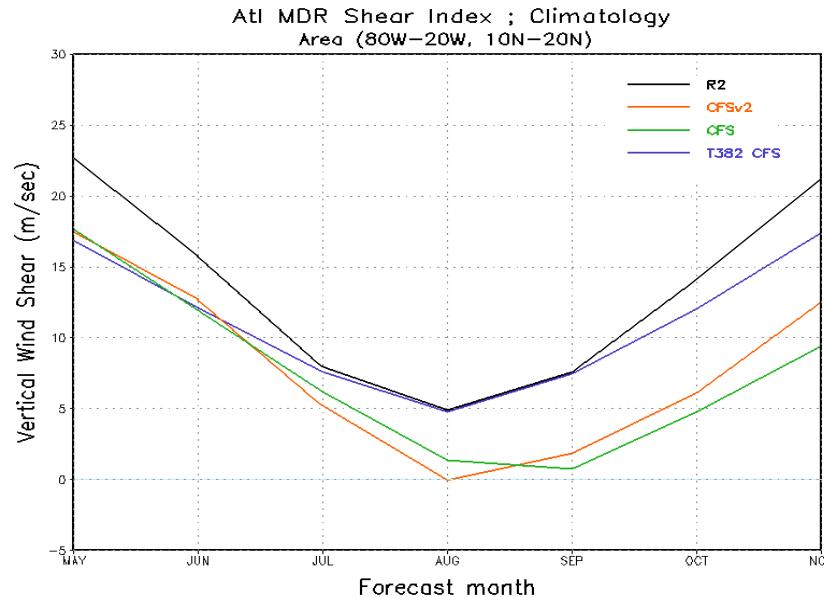
c) CFS T382, 1981–2008



# Climatological Seasonal Cycle - SST

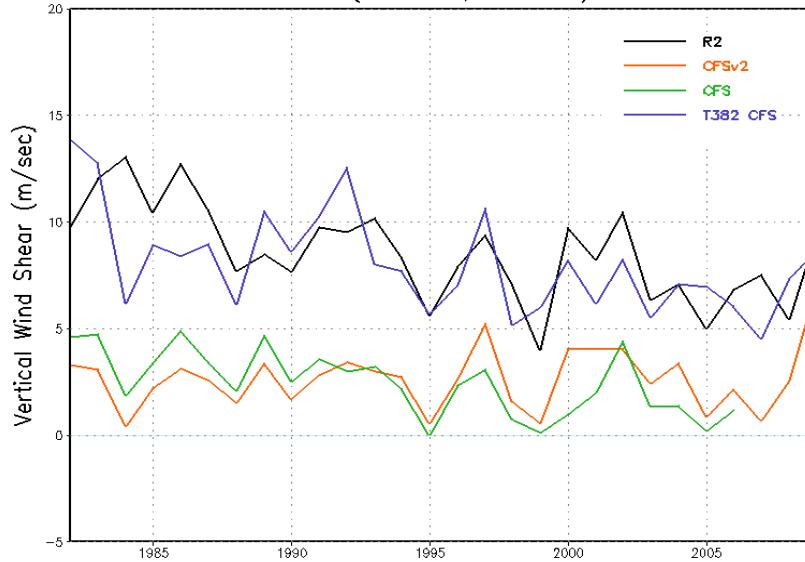


# Climatological Seasonal Cycle - Wind Shear

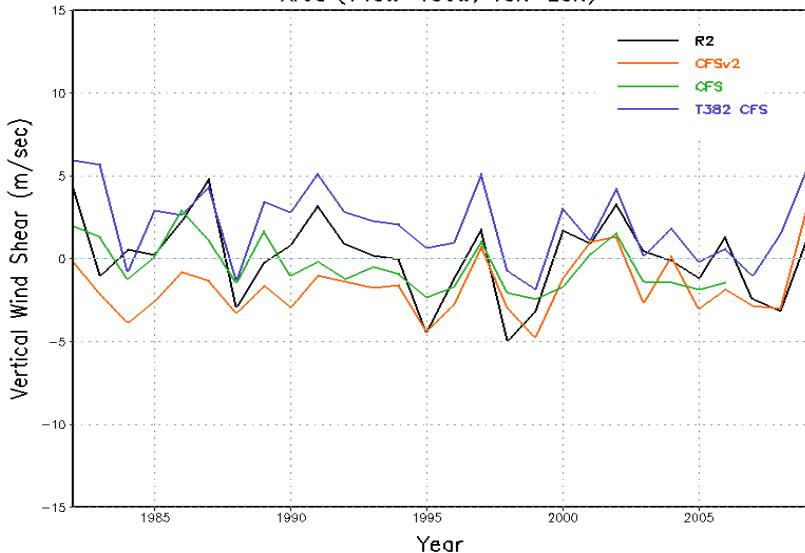


# Interannual Variability - Wind Shear

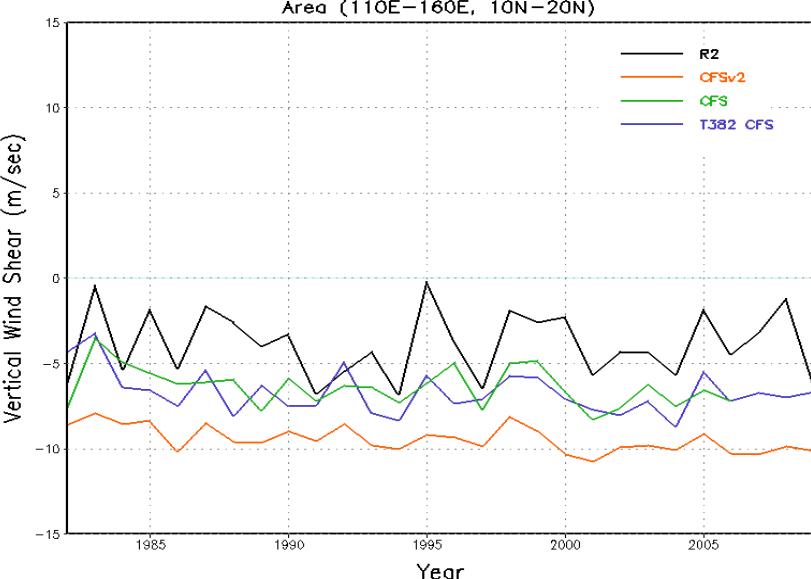
Atl MDR Shear Index; ASO  
Area (80W–20W, 10N–20N)



ENP Shear Index; ASO  
Area (140W–100W, 10N–20N)



WNP Shear Index; ASO  
Area (110E–160E, 10N–20N)



## Summary

- CFS v2 produces too many storms in ATL, ENP and NI Basins
  - Low interannual variability in storm count
  - Missing Trends
- WNP is better simulated; however, the seasonal cycle peaks too early
- Seasonal cycle in NI shows improvement over CFS T382 hindcasts
- Too many storm formation may be attributed to weak wind shear over the main development regions during the NH storm season